

1 What is claimed is:

2 1. An after-package voltage trim circuit for an integrated circuit (IC) for generating a
3 trim voltage signal to add to an initial voltage reference signal generated by said IC, said
4 voltage trim circuit comprising:

5 an after-package trim cell circuit array configured to receive a sequential binary
6 signal and provide a trim cell circuit array digital signal equal to said sequential binary
7 signal;

8 a digital to analog converter (DAC) configured to receive said trim cell circuit
9 array digital signal and provide an analog trim current signal representative of said trim
10 cell circuit array digital signal; and

11 a resistive element configured to convert said analog trim current signal into said
12 trim voltage signal, wherein said trim voltage signal is added to said initial voltage
13 reference signal.

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15 2. The trim circuit of claim 1, wherein said resistive element comprises a resistor.

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17 3. The trim circuit of claim 1, further comprising:

18 a register configured to provide said sequential binary signal.

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20 4. The trim circuit of claim 3, further comprising an isolation trim circuit configured
21 to isolate said after-package trim cell circuit array from said register upon receiving an
22 isolation signal from said register.

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1 5. The trim circuit of claim 1, wherein said after-package trim cell circuit array
2 comprises a plurality of after-package trim cell circuits.

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4 6. The trim circuit of claim 5, wherein one of said plurality of after-package trim cell
5 circuits includes a sign cell circuit configured to provide a bit value to said DAC
6 representative of a desired sign of said trim current signal.

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8 7. The trim circuit of claim 5, wherein said sequential binary signal has a
9 predetermined number of bits and wherein each of said plurality of after-package trim
10 cell circuits is configured to receive one bit of each of said predetermined number of bits.

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12 8. The trim circuit of claim 7, wherein each one of said plurality of trim cell circuits
13 comprises:

14 at least one switch responsive to said one bit to conduct when said one bit is high and
15 to not conduct when said one bit is low.

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17 9. The trim circuit of claim 8, wherein each one of said plurality of trim cell circuits
18 further comprises a logic decision circuit having an output coupled to said DAC, wherein
19 said output of said logic decision circuit is high if said at least one switch is conducting
20 and is low if said at least one switch is not conducting.

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22 10. The trim circuit of claim 9, wherein said logic decision circuit comprises an OR
23 gate.

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2 11. The trim circuit of claim 3, further comprising a bus controller configured to
3 control said register to generate said sequential bit signal.

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5 12. A method of trimming a reference voltage for an integrated circuit (IC), said
6 method comprising the steps of:

7 generating a binary signal sequence;

8 generating a trim current representative of said binary signal sequence at an output
9 terminal;

10 generating a trim voltage from a resistive element coupled to said output terminal;

11 adding said trim voltage to said reference voltage to obtain a sum;

12 determining if said sum is within a predetermined range of a high precision reference
13 signal; and

14 fixing said trim voltage if said sum is within said predetermined range.

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16 13. The method of claim 12, wherein said resistive element comprises a resistor.

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18 14. The method of claim 12, wherein said fixing step further comprises permanently
19 setting said binary signal sequence at a value that generates said trim voltage resulting in
20 said sum within said predetermined range.

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1 15. The method of claim 12, wherein said generating said binary signal sequence step
2 comprises controlling a plurality of after-market trim cells to generate said binary signal
3 sequence.

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5 16. The method of claim 14, further comprising the step of isolating said trim cells
6 from said IC after said fixing step.

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